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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/502,071	07/19/2004	Dennis W. Prather	00131-00288-USA	2021

30678 7590 01/03/2007  
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EXAMINER
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PETKOVSEK, DANIEL J

ART UNIT	PAPER NUMBER
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2874

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/502,071

Applicant(s)

PRATHER ET AL.

Examiner

Daniel J. Petkovsek

JDP 12/18/06

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2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on RCE amendment filed December 8, 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on July 19, 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This office action is in response to the RCE amendment filed on December 8, 2006 (using the after-final amendment to the claims filed November 9, 2006). In accordance with the amendment, claims 1, 8, 15, and 22 have been amended. Claims 1-41 are pending.

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 9, 2006 has been entered.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-29, 31, 32, 34, 35, 37, 38, 40, and 41 are rejected under 35 U.S.C. 102(b/e) as being anticipated by Allan et al. US 2002/0021878 A1.

Allan et al. US 2002/0021878 A1 teaches (Fig. 25, [0064]) an electro optic switch (and inherent method of using same) comprising: a non-piezoelectric photonic crystal material having first 170 and second 172 waveguides provided therein, wherein the first waveguide is adjacent to the second waveguide along a coupling length, and a change in conductance along the coupling length resulting from an electro-optic effect in the coupling length provides for electro-optic switching between the first and second waveguides (see [0064]), which clearly, fully meets Applicant's claimed limitations.

Regarding independent claims 8 and 15, the photonic crystal waveguide structure has a photonic bandgap (see ABS).

Regarding claims 2, 3, 9, 10, 16, 17, 23, and 24, photonic crystal square and hexagonal lattices are disclosed ([0007]-[0010]).

Regarding claims 4-7, 11-14, 18-21, and 25-28, the propagation constants of the 1<sup>st</sup> and 2<sup>nd</sup> waveguides are equivalent and couple to each other all optical wavelengths in the *symmetrical* arrangements as shown in Fig. 25 ([0064]).

Regarding claims 29, 32, 35, 38, injection of current is disclosed ([0018]), which inherently has charge "carriers".

Regarding claims 31, 34, 37, and 40, the control of Allan et al. '878 serves to *modulate* the coupling of the device.

Regarding claim 41, the optical absorption coefficient will inherently change when the device of Allan et al. '878 is electrically controlled to actuate an optical switching function.

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4. Independent claims 1, 8, 15, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Flory et al. U.S.P. No. 6,775,430 B2.

Flory et al. U.S.P. No. 6,775,430 B2 teaches (ABS, Fig. 2, column 5, line through column 3, line 14) an electro optic switch 30 (and inherent method of using same) comprising: a non-piezoelectric photonic crystal material having first 33 and second 34 waveguides provided therein, wherein the first waveguide is adjacent to the second waveguide along a coupling length, and a change in conductance along the coupling length resulting from an electro-optic effect in the coupling length provides for electro-optic switching between the first and second waveguides (see in particular column 5, lines 55-65), which clearly, fully meets Applicant's claimed limitations.

Regarding independent claims 8 and 15, the photonic crystal waveguide structure has a photonic bandgap (see summary).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 30, 33, 36, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allan et al. US 2002/0021878 A1, further in view of Augusto US 2002/0101895 A1.

Allan et al. US 2002/0021878 A1 teaches (Fig. 25, [0064]) an electro optic switch (and inherent method of using same) comprising: a non-piezoelectric photonic crystal material having

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first 170 and second 172 waveguides provided therein, wherein the first waveguide is adjacent to the second waveguide along a coupling length, and a change in conductance along the coupling length resulting from an electro-optic effect in the coupling length provides for electro-optic switching between the first and second waveguides (see [0064]). Allan et al. '878 does not *explicitly* teach the change in conductance is optically induced by electron-hole pair generation (claims 30, 33, 36, and 39).

Augusto US 2002/0101895 A1 teaches electro-optical switching device using photonic crystals in which electron hole pairs are generated in the photonic crystal material to inherently change properties of the photonic bandgap with a change in conductance, in order to inherently modify such property.

Since Allan et al. '878 and Augusto '895 are both from the same field of endeavor, the purpose disclosed by Augusto '895 would have been recognized in the pertinent prior art of Allan et al. '878.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to recognize that changing conductance along a coupling length by electron hole generation would have been an obvious modification of the prior art to Allan et al. '878, for the purpose of efficiently controlling the conduction band in the photonic crystal structure.

### ***Response to Arguments***

7. Applicant's arguments, see amendment, filed November 9, 2006, with respect to the rejections to Cotteverte et al. '682 have been fully considered and are persuasive. The rejections to Cotteverte et al. '682 have been withdrawn.

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8. Applicant's arguments filed November 9, 2006 have been fully considered but they are not persuasive. The rejections to Allan et al. '878 meet the requirements of 35 U.S.C. 102(b/e). The Examiner respectfully asserts that Applicant is giving "along a coupling length" too narrow of a claim construction. The upper and lower clad regions of Allan et al. '878 are, at least broadly defined, "along a coupling length" of the electro optic switch.

9. Independent claims 1, 8, 15, and 22 are also rejected under Flory et al. U.S.P. No. 6,775,430 B2 under 35 U.S.C. 102(e), as fully addressed above.

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: PTO-892 form references A-C.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Petkovsek whose telephone number is (571) 272-2355. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Daniel Petkovsek  
December 18, 2006



SUNG PAK  
PRIMARY EXAMINER